

Claims

- [c1] 1. A storage capacitor structure on a substrate, comprising: a first capacitor electrode over the substrate; a capacitor dielectric layer over the first capacitor electrode; a second capacitor electrode over the capacitor dielectric layer, wherein the first capacitor electrode, the capacitor dielectric layer and the second capacitor electrode together form the storage capacitor; a passivation layer over the second capacitor electrode, wherein the passivation layer has an opening that exposes a portion of the second capacitor electrode; and a pixel electrode layer over the passivation layer, wherein the pixel electrode layer has a protruding section, and the second capacitor electrode and the pixel electrode layer are electrically connected through the opening in the passivation layer.
- [c2] 2. The capacitor structure of claim 1, wherein the pixel electrode layer may be separated from the second capacitor electrode by cutting the protruding section of the pixel electrode layer if the first capacitor electrode and the second capacitor electrode form a short circuit.
- [c3] 3. The capacitor structure of claim 1, wherein after the protruding section of the pixel electrode layer is cut due to short-circuiting between the first capacitor electrode and the second capacitor electrode, the pixel electrode layer serves as an upper electrode of the storage capacitor.
- [c4] 4. The capacitor structure of claim 1, wherein the pixel electrode layer has a neck section and a connective section such that the neck section may be cut while the connective section and the second capacitor electrode are electrically connected together.
- [c5] 5. The capacitor structure of claim 4, wherein the protruding structure in the pixel electrode layer is an inward protruding structure.
- [c6] 6. The capacitor structure of claim 1, wherein the pixel electrode layer is connected to a switching device.
- [c7] 7. The capacitor structure of claim 1, wherein the pixel electrode layer is electrically connected to a thin film transistor.

- [c8] 8. The capacitor structure of claim 7, wherein the first capacitor electrode is a portion of the gate terminal of the thin film transistor.
- [c9] 9. The capacitor structure of claim 1, wherein the second capacitor electrode is electrically connected to a common power source.
- [c10] 10. The capacitor structure of claim 1, wherein the pixel electrode layer has some overlapping region with the first capacitor electrode and the second capacitor electrode outside the protruding section.
- [c11] 11. A liquid crystal display device, comprising: a plurality of scan lines; a plurality of signal lines; and a plurality of pixels with each pixel having a liquid crystal cell, a pixel electrode connected to a storage capacitor and a switching element connected to one of the liquid crystal cells and the signal lines, wherein each switching element is connected to one of the scan lines; wherein the pixel electrode has a protruding section such that the pixel electrode is electrically connected to an upper electrode of the storage capacitor through the protruding section.
- [c12] 12. The liquid crystal display device of claim 11, wherein the pixel electrode layer further includes a neck section and a connective section such that the neck section may be cut while the connective section and an upper electrode of the storage capacitor are electrically connected.
- [c13] 13. The liquid crystal display device of claim 12, wherein the protruding section may be cut to detach it from the pixel electrode if the upper electrode and the lower electrode of the storage capacitor are in short circuit.
- [c14] 14. The liquid crystal display device of claim 11, wherein the switching element includes a thin film transistor.
- [c15] 15. The liquid crystal display device of claim 11, wherein the protruding section includes an inward-protruding structure.
- [c16] 16. The liquid crystal display device of claim 11, wherein the upper electrode is a portion of the gate terminal of the switching element.

[c18] 18. The method of claim 17, wherein the pixel electrode layer may be separated from the second capacitor electrode by cutting open the protruding section if the first capacitor electrode and the second capacitor electrode are in short circuit, and the pixel electrode also serves as an upper electrode for the storage capacitor after the cutting operation.

[c19] 19. The method of claim 17, wherein the step of forming the pixel electrode layer further includes the steps of: forming a pixel electrode layer over the passivation layer such that the pixel electrode layer and the second capacitor electrode are electrically connected through the opening; and patterning the pixel electrode layer to form the protruding section in the opening, wherein the protruding section includes a neck section and a connective section.